

NASA TECH BRIEF

Lyndon B. Johnson Space Center



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Lightweight Ducts Fabricated From Reinforced Plastics and Elastomers

Improved lightweight rigid and flexible ducts have been developed that are far superior to aluminum and fiberglass ducts. Kevlar* fabrics, or equivalent, laminated with polyimide or epoxy resin are used in the process for manufacturing of rigid ducts. An alternate approach is to use Kevlar* fabrics with Viton* elastomers, or equivalent, for fabrication of flexible duct. In either case the materials provide two-ply ducts that weigh half as much and are three times stronger than aluminum ducts. Also they will withstand fatigue and abuse from impact better than the fiberglass ducts.

Rigid Ducts:

Basically the fabrication involves four steps:

1. The Kevlar* fabric is prepreged.
2. The fabric is then wrapped or formed on a mold and is coated with resin.
3. The laminate is then cured, and the mold is removed.
4. The formed duct is then coated inside with approximately 0.5 mm (2 mils) of Viton* and is post cured.

Flexible Ducts:

Stronger ducts can be made using Kevlar* fabrics, or equivalent, calendered on two sides with Viton*, or equivalent. These ducts can take greater abuse and are less permeable. The fabrication process involves two steps:

1. The Viton* calender coated Kevlar* fabric is wrapped and formed on a mold using Viton*, or equivalent adhesive.

2. The duct is then cured and removed from the mold.

The fabricated ducts are very light and durable. They can withstand air or gas temperatures below approximately 200° C (400° F).

Note:

Requests for further information may be directed to:

Technology Utilization Officer
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NASA has decided not to apply for a patent.

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04 (Materials)